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Research Article

SIMULTANEOUS ESTIMATION OF AMLODIPINE AND METAPROLAL TABLETS USING VIERTODS EQUATION METHOD

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Abstract: A novel, precise, rapid, economical, and Accurate UV method for simultaneous estimation ofAmlodipine and Metaprolal tablets by Viertods equation method.UV spectra of 10mcg /ml of amlodipine&100mcg/ml of metaprolal drugs in water. UV spectra of amlodipine in water exhibit λ_{max} at 241 nm, whereas metaprolal exhibit at 273 nm. There is no interference of spectrum at λ_{max} of each other for the estimation of both the drugs without separation of each other.The response is linear for AMLO from 5mcg to25mcg the response is linear for MTPL from 50mcg to 250mcg. The regression coefficient of 0.9998 for amlodipine with regression coefficient of 0.9997 for metaprolal.

Key words: Amlodipine, Metaprolal,Viertods equation method.

INTRODUCTION

Metoprolol Succinate (MS) (RS)-1-(isopropylamino)-3-[4-(2-methoxyethyl) phenoxy] propan-2-ol, is a cardio selective drug used in the treatment of hypertension and various cardiovascular disorders.The action of Metoprololsuccinate is mediated through the beta1- selective adrenoceptor blockage, thus causing reduction in heart rate and cardiac output. It is a beta1 selective drug which belongs to the chemical class of beta blockers and is (±) 1 (isopropylamino)-3-[p-(2-methoxyethyl) phenoxy]-2-propanol succinate (2:1) (salt) with molecular formula of $(C_{15}H_{25}NO_3)_2.\ C_4H_6O_4$ and molecular weight is 652.81.[1] Literature reveals UV spectroscopy[2], HPLC [3,4,5], chemometric-assisted spectrophotometric and HPLC method [6,7] have been reported for the estimation of Metoprolol.

Amlodipine (AB), chemically, 2-[(2-aminoethoxy) methyl]-4-(2-chlorophenyl)-1, 4-dihydro- 6-methyl-3, 5-pyridinedicarboxylic acid 3-ethyl, 5-methyl ester, is an anti hypertensive and an antianginal agent in the form of the besylate salt, Amlodipinebesylate. It is not official in any Pharmacopoeia. Various analytical methods have been reported for the assay of Amlodipine Besylate1 in pure form as well as in pharmaceutical formulations. Several spectroscopic [8,9] ,RP-HPLC [10, 11], HPTLC [12,] LC-MS/MS [13], UV [14] have been reported for the estimation of Amlodipine individually and in combination with other drugs. A fixed combination of MET (500 mg) and AML (50 mg) are marketed as tablet formulation (Tolol-AM, Sitelol-AM) in the ration 10:1. This combination is used in treatment of angina pectoris, cardiac arrhythmia and hypertension However, there is no analytical method reported for the simultaneous estimation of Metoprolol and Amlodipine in a combined dosage formulation. Present work describes simple, accurate, reproducible, rapid and economical methods for simultaneous estimation of Metoprolol and Amlodipine in tablet formulation using viertods equation method.

MATERIALS AND METHODS

Drugs and Instrument

Amlodipine and metaprolal, were obtained by the courtesy of Aaschool Pharmaceuticals, Ongole as gift samples. The spectra were recorded in UV spectrophotometer (ANALYTICALS, UV 1601 PC.)

Estmation of Amlodipine and Metaprolal:

Estimation of Standard:

Weigh accurately about 100mg of amlodipine and dissolved in 50 ml of water in 100ml volumetric flask and made up to 100ml with and further dilutions were made with water to get 10µg/ml of amlodipine

The above procedure is repeated for metaprolal also the solutions are made to 100 µg/ml were scanned between 400nm to 200nm in UV visible spectrophotometer .

Selection of Wavelength for Estimation of Amlodipine and Metaprolal

- As high as polynomial value for the drug to be estimated at the selected wavelength.
- The polynomial value should be nearer to zero for the other drug at selected wave length.
- As per the above statement we selected 241.0nm for the estimation of amlodipine and 273.0nm for the estimation of metaprolal

OPTIMIZATION OF PARAMETERS

UV spectra of 10 µ g/mlsolution of amlodipine in water and 100 µ g/ml of metaprolal in water were recorded between 200 nm and 400 nm. From these spectra data for AMLO and MTPL were obtained. Graph of AMLO compared with that of corresponding MTPL and the optimum conditions for simultaneous equation method were selected taking following points in to consideration. (Table-4)

- The co-efficient value is negligible for one drug and as high as possible for the other.
- As far as possible the wavelength range where there was steep rise in co-efficient value of either drug avoided (Fig : 1).

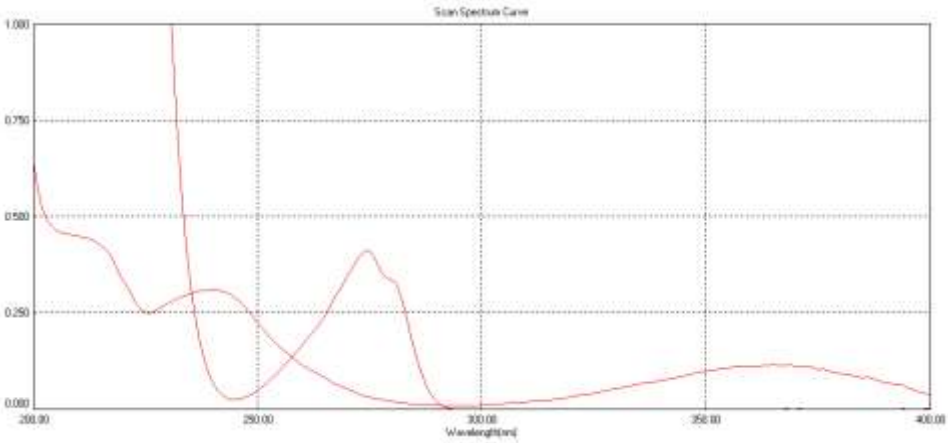

Fig-1-Combined graph showing the spectrum of the AMLO and MTPL drugs in formulations

RESULTS AND DISCUSSION

Estimation of Amlodipine and Metaprolal

UV spectra of 10mcg /ml of amlodipine&100mcg/ml of metaprolal drugs in water. UV spectra of amlodipine in water exhibit λ_{max} at 241 nm, whereas metaprolal exhibit at 273 nm. There is no interference of spectrum at λ_{max} of each other for the estimation of both the drugs without separation of each other(Table:1)

Table 1: UV spectra of 10mcg /ml of amlodipine&100mcg/ml of metaprolal drugs in water

S.No	A Value for AMLO	$A_{(1\%1cm)}$ For AMLO	A value for MTPL	$A_{(1\%1cm)}$ for MTPL
1	0.305	305	0.411	411
2	0.308	308	0.409	409
3	0.311	311	0.411	411
4	0.317	317	0.399	399
5	0.312	312	0.389	389
Mean	0.311		0.403	

Determination of A:

Simultaneous estimation of these AMLO and MTPL drugs are estimated by using the following equation method

$C_x = \frac{A_2\ a_{y1} - A_1\ a_{y2}}{a_{x2}\ ay_1 - a_{x1}\ a_{y2}}$ and $C_y = \frac{A_1\ a_{x2} - A_2\ a_{x1}}{a_{x2}\ a y_1 - a_{x1}\ a_{y2}}$

The $A_{1\%1cm}$ a constant which results the coefficient corresponding to absorbance of the solution kept in 1cm cell which can be used for the calculation of concentration of sample similar to the use of (A1%1cm) in spectrophotometer.λ_{max} values corresponding to the absorbance values of 10mcg/ml solution of AMLO and MTPL are calculated as above and from this the (A1%1cm) values are calculated.

LINEARITY: (Table : 2, 3) and Graphs (2, 3)

Table 2: Linearity of Amlodipine

Sl.no	Concentration Of AMLO	A value
1	5	0.156
2	10	0.310
3	15	0.466
4	20	0.605
5	25	0.759
%RSD		0.4887

Table-3: Linearity of Metoprolol

Sl. no	Concentration Of MTPL	A value
1	50	0.204
2	100	0.411
3	150	0.619
4	200	0.844
5	250	1.049
	%RSD	0.952

FORMULATION:

The average weight of the tablets was determined and powdered. Tablet powder equivalent to 5mg of AMLO (50mg of MTPL)was weighed and transferred into a 100ml volumetric flask about 30ml of water, was added & shaken for 15min for complete dissolution of the drugs and make up to the volume with distilled water. Filter of through Whatman filter paper and dilutions were made with distilled water to attain the concentration of AMLO (5mcg/ml) and analysiswas done as described above the marketed formulation contain 5mg of AMLO and 50mg of MTPL is analyzed by using developed analytical method and results are within the acceptable limit(Table:4).

Table 4: Formulation Studies

Amlodipine			Metaprolal	
S.no	mg/Tablet	%label claim	mg/Tablet	%label claim
1	4.91	98.25%	602.00	100.33%
2	4.87	97.40%	597.26	99.54%
3	4.90	98.11%	604.31	100.71%
4	4.93	98.38%	588.20	98.03%
5	4.91	98.16%	594.32	99.06%
Mean	490.84		597.37	
%RSD	0.49%		1.28%	

Label claim for amlodipine is 5mg and metaprolal is 50mg in given tablet

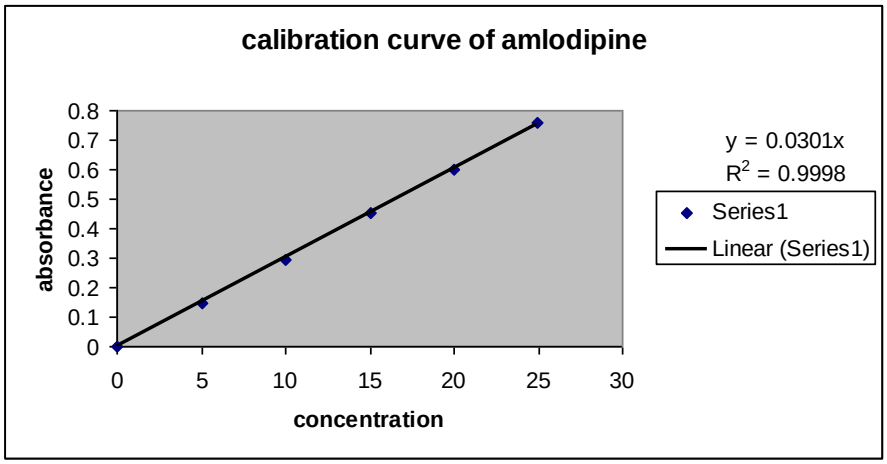

Fig-2: Calibration curve of amlodipine

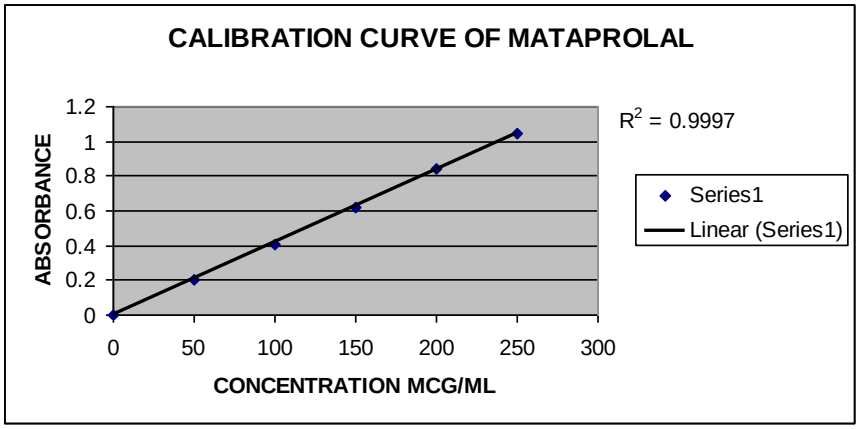

Fig-3: Calibration curve of Mataprolol

RECOVERY STUDIES:

Adding known amount of Pure AMLO and Pure MTPL to the pre analyzed market sample carried out recovery study. Three different levels, 50%, 100% and 150% were used for spiking. The results are within the acceptable limit(Table:5).

Table 5: Recovery Studies

AMLODIPINE		METAPROLAL	
Level added %	Recovery %	Level added %	Recovery %
50%	98.44%	50%	101.27%
100%	101.6%	100%	100.57%
150%	102%	150%	99.45%

CONCLUSION

The proposed methods are simple, accurate and reproducible. The irrelevant absorptions are eliminated by the proposed method. It is suitable for the simultaneous estimation of amlodipine&metaprolal in tablet formulation.

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